

Metrics in Global Health: Situated Differences in the Valuation of Human Life

Maldonado, Oscar Javier; Moreira, Tiago

Veröffentlichungsversion / Published Version
Zeitschriftenartikel / journal article

Zur Verfügung gestellt in Kooperation mit / provided in cooperation with:
GESIS - Leibniz-Institut für Sozialwissenschaften

Empfohlene Zitierung / Suggested Citation:

Maldonado, O. J., & Moreira, T. (2019). Metrics in Global Health: Situated Differences in the Valuation of Human Life. *Historical Social Research*, 44(2), 202-224. <https://doi.org/10.12759/hsr.44.2019.2.202-224>

Nutzungsbedingungen:

Dieser Text wird unter einer CC BY Lizenz (Namensnennung) zur Verfügung gestellt. Nähere Auskünfte zu den CC-Lizenzen finden Sie hier:
<https://creativecommons.org/licenses/by/4.0/deed.de>

Terms of use:

This document is made available under a CC BY Licence (Attribution). For more Information see:
<https://creativecommons.org/licenses/by/4.0>

Metrics in Global Health: Situated Differences in the Valuation of Human Life

*Oscar Javier Maldonado & Tiago Moreira**

Abstract: »Metriken in der globalen Gesundheitsversorgung. Situative Unterschiede in der Bewertung von Menschenleben«. This paper explores the role of knowledge, standards, and metrics in global health. Our point of departure is the observation that the emergence of 'global health' as a domain of research, policy, and practice in the last three decades or so has coincided with an increased interest in the validation and use of measures of health, such as the *Disability Adjusted Life Year* (DALY), in monitoring and assessing health equity across territories and populations. This 'elective affinity' between global health and health metrics has become the focus of scholarly debate in the social sciences. In this paper, we seek to contextualise and critically discuss the different positions in this debate. We suggest that emplacing health metrics within the neo-liberal logic of health production –one where the 'mechanisms of life' are aligned with the maximisation of economic productivity– does not fully capture the interactive relationship between health measurement and the politics of health. Instead, we argue that this relationship has been characterised by controversy and uncertainty about how to interlock normative ideals and approaches to knowledge-making about health.

Keywords: Metrics, DALY, Global Health, quantification, valuation.

1. Introduction

This paper explores the role of knowledge, standards, and metrics in global health. Our point of departure is the observation that the emergence of 'global health' as a domain of research, policy, and practice in the last three decades or so has coincided with an increased interest in the validation and use of measures of health, such as the *Disability Adjusted Life Year* (DALY), in monitoring and assessing health equity across territories and populations. This 'elective affinity' between global health and health metrics has become the focus of scholarly debate in the social sciences. In this paper, we first seek to contextualise and critically discuss the different positions in this debate. A critical read-

* Oscar Javier Maldonado, Escuela de Ciencias Humanas, Universidad del Rosario, Calle 12c #6-25, Bogotá, Colombia; oscar.maldonado@urosario.edu.co.
Tiago Moreira, Department of Sociology, Durham University, 32 Old Elvet, Durham DH1 3HP, United Kingdom; tiago.moreira@durham.ac.uk.

ing of health metrics centred in the neo-liberal logics of health production does not fully grasp the complex relations between health measurement and the politics of health. Instead we show that this relationship has been characterised by an active debate about how to interlock normative ideals and approaches to knowledge-making about health.

This analysis results from approaching the subject from the perspective of *science and technology studies* (STS). STS investigates the complex, controversial processes through which knowledge and technology are brought together within social and culturally relevant settings and relations. Contrary to what is usually assumed, controversies – particularly public disputes of a technical variety that concern most people in society – are not mere surface phenomena, denoting only the biases of the opposing sides. Instead, controversies should be seen as windows to the understanding of society-in-the-making. As Latour put it, controversies are “not simply a nuisance to be kept at bay, but what allows the social to be established” (Latour 2005, 25). This is because they substantiate ways of knowing and acting on the world and concurrently mould institutions, policies, and programmes.

Controversies about standards and forms of measurement are particularly important from a sociological point of view. Standards – in our case, standardised forms of measuring and quantifying health – are explicit, formalised rules or specifications informing collective engagement with objects or persons in a particular realm of action; in this, they are able to “regulate and calibrate social life by rendering the [...] world equivalent across cultures, time, and geography” (Timmermans and Epstein 2010, 70). The normative bearing of the work towards calibrating and drawing equivalences is exquisitely encapsulated in Thévenot’s (1984) concept of ‘investment in form’, which refers to the process of making durable conventional arrangements – ‘a stable relation with a certain lifespan’ – support and enforce co-ordination between social actors. Thévenot’s suggestion is that these arrangements are both cognitive and normative, that is to say, they require both sense-making and rule-making. Subsequent work with Boltanski clarified this dual role of standards:

[w]hen persons grasp events as human actions in the perspective of coordination, they relate behaviours to some relevant good, the format of the good being highly variable ... When properly formatted, persons and things qualify for a certain mode of coordination. (Thévenot 2006, 111-2)

Rearticulating the traditions of conflict and functionalist sociologies, Boltanski and Thévenot (2006) argued that, in situations of conflict and uncertainty, actors and groups enter into a dynamic of critique and justification with the goal of building conditions for the qualification of people or things in orders of worth. These conditions recursively act as cognitive scaffolds to understand situated action and act or follow rules appropriately. Importantly, they argue that actors’ moral justifications entail not only processes of sense-making, but

also require investment – or rather, durable, explicit, objectified commitment – as a way of ‘grasping events’.

Although not fully adopting Boltanski and Thevenot’s emplacement of the dynamics of critique and justification within a set of ‘grammars of the common good’ (cities), we draw on their model to support our empirical description of controversies surrounding the ways of measuring health. From this perspective, standards, such as DALYs, are not mere boring, ‘technical objects’; instead, studying their creation provides direct insight into the building of institutions and the embedding of normative and epistemic arrangements. Furthermore, we argue that such standards are not made *de novo* but encounter a world that is already formatted. The conventional sociological framework used to understand these processes differentiates between ‘universal’ standards and ‘local’ practices (i.e., between macro and micro scales). Boltanski and Thevenot’s pragmatic sociology challenges this framework by drawing analytical attention to critical situations and controversies as settings where the relationship between structure and agency is articulated and negotiated by social actors striving for equivalence.

This is consequential for our approach to health metrics. Firstly, we must attend to the principle of symmetry (Bloor 1991) to avoid becoming a part of, what Boltanski and Thevenot would call, the ‘critical sociology’ of global health. This is not done in an effort to rise above political disputes, but instead, to trace and understand how existing institutional formats became entangled with particular ways of knowing (e.g., Shaping and Sheffer 1985). Thus, we draw on scientific literature and published reports on health measurement and metrics to identify the network of researchers, institutions, and policies associated with different approaches to measuring population health. We ask: *how and why did particular forms of measurement become entangled with specific health care policies?* In the second section of this paper, we link existing critiques of the normative assumptions embedded in the DALY to an important and outstanding controversy in the field of public health (Sassi 2006; Voigt and King 2014). Dating back to the turn of the 1980s, the controversy pitted what came to be known as the ‘primary health care movement’ against the proponents of an approach to international health care programmes that favoured ‘rationing’. We suggest that while the former relied on an evolutionary modelling of the relationship between types of public health programmes and the health of populations, the latter flattened the historical differences between societies to map disease and prioritise ‘interventions’.

As a result, we provide an analysis of health metrics that is saturated with diversity. Instead of seeing the consolidation of the DALY as a process unique to late modernity’s financialisation of health, in the third section of this paper we reconstitute the process through which the DALY emerged within an older, historically constituted ecology of health measurement. We thus suggest that the DALY can be emplaced within what Clarke (1991) conceptualised as a

‘social arena’ of health measurement – a field of action around a specific issue shaped by conflict, competition, cooperation, and exchange. This provides insight into the relational underpinnings of the DALY’s genesis and development. By opening the analysis of health metrics in global health to this wider field of action, the DALY can be understood as the contingent outcome of an on-going process of negotiation. By exploring how ‘it could have been otherwise’ (Bijker and Law 1992), our paper opens the imagination to path and possibilities of alternative ‘investment in form’ in health.

2. Measuring Global Health

Historical analyses usually agree that the transition from international to global health is evidenced in the consolidation of a multi-actor approach to financing, organising and delivering health technologies and interventions in the 1990s, often underpinned by a collective belief that health can stimulate economic development (Packard 2016). For many, this transition was marked in two key publications: the 1993 World Bank *World Development Report: Investing in Health* and the 1996 *Global Burden of Disease* (GBD) Study report (Murray and Lopez 1996). The report from the World Bank is seen to have set the reform agenda for healthcare system in the developing world, arguing for a ‘modernisation’ strategy underpinned by the overall goal of efficiency delivery through “greater diversity and competition” (World Bank 1993, iii). Seeing efficiency as driven by the optimal distribution of resources obtained from competition between alternatives, the World Bank further advocated that this aim could be obtained by maximising the ratio between input resources – at a specific cost – and a specific health outcome (World Bank 1993, 25). The GBD Study, which the World Bank funded along with the *World Health Organisation* (WHO), proposed that it was necessary to develop a ‘single measure’ to attain this efficiency goal, or rather, an “internationally standardized form” that would support “policy-makers [in comparing] the relative cost-effectiveness of different interventions” (Murray and Lopez 1996, 6-7) as well as comparing health care systems across space and time. In focusing on developing a metric, they were motivated by the view that countries’ main burden of disease could no longer be straightforwardly divided along a communicable/non-communicable disease line and that the “so called ‘epidemiological transition’ [was] already much further advanced [in the South] than many public health specialists appreciate[d]” (Murray and Lopez 1996, 1).

In 1971, the epidemiologist Abdel Omran proposed that the processes of demographic transition of populations with high fertility and mortality towards low levels of fertility and mortality had been paralleled by a change in the dominant cause of death in the population. It was first characterised by ‘famine and pestilence’, then by ‘pandemics’, and finally by ‘degenerative diseases’

(Omran 1971). Although this model was mainly designed to argue for the importance of public health infrastructure in decreasing mortality, as evidenced by the demographic transition theory (see below), the paper quickly became a reference point for emerging controversies and debates about both the nature of the relationship between mortality, morbidity, and the quality of life in high-income countries (Weisz and Olszynko-Gryn 2009; Moreira 2016).

Such emphasis on the power of metrics in propelling the transformation of health care across territories and populations has recently attracted the interests of scholars from anthropology, sociology, and science and technology studies (STS). Focusing on the role of such metrics in the shaping of contemporary governance of global health, these studies enable, in turn, the identification of the normative assumptions, local implications, and institutional consequences of standardised measures of global health.

Drawing on a Foucauldian framework, Wahlberg and Rose (2015) explore the GBD Studies as a new technology of the governmentalization of life through the quantification of disability. Noting a shift in the forms of knowledge produced about populations, from mapping disease patterns to calculating the state of world health, they argue that this denotes a new epidemiological style of thought in which “the problem of morbid death gives way to that of morbid living, made calculable through a metrics of ‘severity’, ‘disability’ and ‘impairment’” (Wahlberg and Rose 2015, 60). In this process, the social and personal consequences of living with disease become an object of political concern that is made both knowable and calculable; thusly, it becomes a target of intervention. This new style of thought, they argue, drawing on GBD documentation, can be traced back to the development of the concept of ‘epidemiological transition’.

In 1971, Daniel Sullivan published what is considered a seminal contribution to the measurement of health: an index of ‘health expectancy’ that calculated ‘Disability-free Life Expectancy’ (Sullivan 1971). Designed as a rational and empirical formula to assist decision-making when “public health programmes compete with each other and with other government activities for budget allocations” (Sullivan 1966, 1), the Sullivan method is a key exemplar in a more general shift towards the measurement of quality of life from the 1970s onwards (Bowling 2005). Addressing this shift, Armstrong and Caldwell (2004) argue that the rise of this ‘quality of life’ repertoire can be seen as counterpoint to “the dream of a technological future” in health care. By measuring function or subjective well-being, such measures bring to bear the often modest benefits of biomedical technologies in the lives of patients. This being said, it is important to recognise that this questioning was closely linked to both an observed stabilisation of mortality levels in the populations of high income countries in the 1960 and 1970s (Manton 1992) and the shared belief that only technological advances in chronic disease management – or ‘degenerative diseases’ – would enhance survival rates (Moryama 1964).

For Wahlberg and Rose, these new health metrics are equally encased by what they label a ‘new epidemiological gaze’ where the focus moves from “biological processes and events of life (disease and death) to social processes and events of living (disability and health)” (Wahlberg and Rose 2015, 86) in the management of populations. They thus see continuity between the health measurement movement of the 1970s and the later work developed by the World Bank and the GBD Studies. While this might be justified by the fact that the key metric proposed by the GBD studies – the DALY – can be seen as an adaptation of the Sullivan method, there are significant technical differences between the metrics used. Usually, Sullivan health expectancies are measured by computing different states of health to obtain an aggregate of ‘full health’. By contrast, the DALY focuses on measuring the effects of a disease in reducing “human function”, one DALY being equivalent to a ‘one lost year of full health’. Epistemically, the DALY can be grouped with measures of mortality and morbidity that focus on *Years of Life Lost* (YLL).

Table 1: Burden of Disease Metrics

Metrics	Formula/Definition
YLL	YLL = N x L where: N = number of deaths L = standard life expectancy at age of death in years
YLD	YLD = I x DW x L where: I = number of incident cases DW = disability weight L = average duration of the case until remission or death (years)
DALY	DALY = YLL + YLD. The disability-adjusted life year (DALY) is a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability, or early death.
QALY	QALY=Years of Life x Utility Value The years of life remaining for a patient following a particular treatment or intervention and weighting each year with a quality of life score.

Introduced by Mary Dempsey in 1947 with the aim of comparing mortality due to tuberculosis with heart diseases and cancer (Romeder and McWhinnie 1977), YLL specifically focused on causes of mortality for setting priorities in health care – those causing more mortality being higher in the ranking of concern and investment. Regularly published by national statistical agencies by the 1970s, YLLs were a relatively stable set of procedures in epidemiology, not only because it used the central epistemic referent in epidemiology – death –

but also because it could rely on readily available data on causes of death. It is from this perspective that it can be said that the DALY “extends the notion of mortality gaps to account for time lived in health states worse than ideal health” (Murray, Salomon, and Mathers 2000, 983).

Despite these conceptual differences, Wahlberg and Rose propose that there are key commonalities across metrics in that they enable forms of power that are conceived and implemented as “strategies for prioritization and evaluation” (Wahlberg and Rose 2015, 86). This is significant because it links the quantification of health to a mode of public health intervention that enacts healthcare as specific technological packages and programmes, whether to maximise health expectancy or to minimise health gaps.

From the same governmentality approach, Kenny (2015) analyses the design of the DALY and its role in the governance of global health. Focusing her analysis on the World Bank’s formulation of the DALY, Kenny argues health metrics accomplish an ‘economization of life’ by disaggregating lifetimes into component units of time. Through this procedure, it is possible to represent life as a revenue stream to be maximized through practices of self-investment in one’s own health. In this, health is configured in terms of human capital expressed in the use of age weighting, discounting rates, disability severity weighting and standard life expectancy, the key procedures used in the DALY approach to derive measures of ‘lost health’ (Kenny 2015, 12).

This linkage to the concept of ‘human capital’ provides Kenny with a bridge between health metrics and the wider transformations of what (2009) labelled as neo-liberal forms of power-knowledge and, in particular, by how the theory of human capital enacts labour as a combination of ability and investment (education, etc.) from which an income can be obtained. Human capital, as understood in economics, is the stock of skills that people possess. This stock increases the value of people as a labour force (Becker 1962, 9). “The flow of these skills is forthcoming when the return to investment exceeds the cost (both direct and indirect)” (Goldin 2014, 53). Human capital encompasses the notion that investments in people, such as education, training, and health, increase an individual’s productivity and, therefore, value. From this perspective, Kenny proposes that health metrics can be understood as ‘technologies of governance’, by reducing uncertainty on the types of investment, health technologies, or services that produce health and maximise the value of individual labour (Kenny 2015, 12).

The consequences of framing health in such a narrow way are brought to bear in Adams’ (2016) ethnography of the impact of audit practices and quantification in global health. Emphasising the role of international organisations, NGOs, and governments in this process, she argues that they have led to a dual economization of health and fiscalization of life. Similarly to Kenny, Adams sees the economization of health as resulting from the adoption of ways of organizing and thinking about healthcare from economics, particularly those

based on understanding healthcare as a market. The fiscalisation of life is related with the increasing participation of actors from the financial sector in global health. In these processes, health metrics are key instruments in the economization of health. Furthermore, different health metrics also enable the maintenance of distinctions between economic regions of the globe, the emphasis on 'quality of life' (QALY) being distinguished from that of 'disability'. Such distinctions make sense, Adams argues, because:

in the Global North what mattered was counting the cost of keeping people alive, whereas in the Global South what mattered was plausible justification for continued expenditures in relation to death and disease burden. (Adams 2016, 27)

Adams major concern is the side effects of these calculations. By emplacing healthcare in a market frame, countries, communities, and healthcare providers have to adjust to the demands of data production. Thus, the production of data regarding the impact of investment in health becomes the major goal of strategies and funded projects rather than the actual delivery of healthcare. This exerts violence, particularly through the necessary arithmetic gymnastic to make countries comparable, and the pretention of value neutrality in resource allocation that these metrics make possible (Adams 2016, 30). Finally, for Adams, the most serious consequence of the economization of health is to think of life as money, substituting politics for a market principle. This renders marginal and invisible other forms of evidence and other experiences in global health that – despite working in practice – cannot be translated into the language of the market (Maldonado 2018). This 'silencing' of the local ways of enacting and valuing health practices endangers the sustainability of global health programmes and undermines health equity as a principle.

Drawing on Foucault's writings on governmentality, Wahlberg and Rose (2015) and Kenny and Adams (2015) provide an important set of insights into global health as an apparatus of power-knowledge, highlighting the historically constituted, political and economic contexts in which it emerged. Their analysis is particularly relevant to understand how specific modes of knowledge making and evaluation of evidence became uniquely suited to support forms of governance that seek to maximise efficiency in the delivery of discrete interventions and technologies. This brings to bear the contingent nature of current global health processes and institutions while providing important clues on their genealogy. However, a disadvantage of this analytical approach is that it departs from the central role that metrics, such as the DALY, play in contemporary global health and tends to understate the controversies and indecisions that led to the present situation. To recover the paths not taken and to fully account for ways of enacting and valuing health that have been silenced, it is necessary to focus on the institutional transformations of international health governing during the second half of the twentieth century and to ask the question: *What other forms of global health policy could have been possible?*

3. Recovering Diversity in Global Health: Social Change vs. Efficiency

In this section, we aim to recover some of the epistemic and political diversity that preceded the stabilisation of the global health apparatus as we know it today. To do this, we shift our focus from the establishment of this assemblage in the 1990s to explore a wider, longer process. As suggested by Cueto (2004), it is possible to link the focus on metrics in global health to a controversy about the role of primary health care in international health policy in the late 1970s (See also Brown et al. 2006; Rodin 2013).

As we argued above, in the 1970s, experts such as Omran aligned with policy makers and the WHO to propose a focus of international health on primary health care (Cueto 2004). Through the motto ‘Health for All’, the primary healthcare movement agenda expressed a social understanding of health and a belief that policy should be focused on the improvement of living and material conditions of the poor. It proposed deploying community-embedded physicians as agents of change. Support for this position came both from the acceptance of social epidemiological models of public health, such as McKeown’s model (1976), and from:

a new political context characterized by the emergence of decolonized African nations and the spread of national, anti-imperialist, and leftist movements in many less-developed nations. (Cueto 2004, 10)

This political orientation was expressed in the Alma-Ata declaration of 1978 which, as the principles of the primary health care movement, identified the use of appropriate technologies, the opposition to medical elitism, and a concept of health as a tool for socioeconomic development (Cueto 2004, 12). A year later, the 32nd World Health Assembly endorsed the conference’s declaration.

In the context of the Cold War, however, the Alma-Ata declaration was not well received by the main international donors, particularly by the United States. The declaration was accused of being abstract and too holistic to define specific, grounded policies (Schwartländer, 1997). Key amongst the critics was the Rockefeller Foundation’s concern with the lack of strategies to define priorities in international health. This led to it sponsoring a small conference in 1979 entitled *Health and Population in Development* at its Bellagio Conference Centre in Italy. The conference gathered representatives from the World Bank, the Canadian International Development and Research Centre, the Ford Foundation, and the US Agency for International Development (USAID). As its main outcome, the conference led to the production of a report written by Julia Walsh and Kenneth S. Warren (1979) where an alternative set of principles to the Alma-Ata conference and the World Health Assembly were outlined.

Entitled *Selective Primary Health Care, an Interim Strategy for Disease Control in Developing Countries*, the Bellagio Centre conference report is key

to understanding the stabilisation of the global health assemblage as we know it today (Walsh and Warren 1979). Casting the objectives of the Alma-Ata conference as “laudable but unattainable in terms of its prohibitive costs and the numbers of trained personnel required” (Walsh and Warren 1979, 145), the authors proposed that the concept of selective primary health care should be underpinned by the need to set priorities in what health programmes and interventions to finance. This entailed two sets of data generation: identification of target diseases based on assessments of prevalence, morbidity, and risk of mortality; and evaluation of the medical interventions used to manage those illnesses, which was to be supported by measures of effectiveness and cost. Primary healthcare, the report argued, should focus on cost-effective interventions that reduce most of the burden of a particular disease – measured here as numbers of deaths – to the lowest cost. This approach was thus to be infrastructurally supported by a combination of measures that detailed the differential contribution of specific diseases to the overall mortality, with assessment of effectiveness produced through randomised controlled trials of specific interventions.

Their proposals came to bear one year later in the Kaiser Foundation International-sponsored Ghana Health Assessment Project (GHAPT 1981). Seen as a key technical antecedent to the formulation of the DALY and the GBD study of 1993 (Murray, Salomon, and Mathers 2002), the project was explicitly motivated by the apparent lack of progress in levels of population health despite increases in health care facilities and personnel in Ghana. To examine this, the investigators designed a method to estimate the health impacts of different diseases, thus enabling the examination “of the magnitude of the change [health interventions] might be expected to produce in health status” (GHAPT 1981, 73). Recognising the technical difficulties of measuring the impact of illness in economic activity, the project team opted for a measure of ‘healthy days of life lost’ as a proxy assessment of the impact of illness on productivity. This form of measurement, in turn, was deemed able to formulate priorities by quantifying the “healthy life saved” by, for example, a measles immunisation program vis-à-vis an outpatient clinic for the same condition. These arguments, it was suggested, should be more “persuasive [...] than the mere assertion that prevention is better than cure” (GHAPT 1981, 77).

This contrast between ‘mere assertion’ and ‘quantification of healthy life’ makes reference to the controversial nature of the Ghana project team and the Bellagio Centre conference’s proposals. Although not explicitly challenging the alternative position, it aimed to grade the epistemic quality of different approaches to prioritisation. In doing so, it provides, albeit from a biased standpoint, the link between styles of reasoning and knowledge making about population health and the politics of health care that underpins this controversy. The conflict was thus about the politics of knowledge in international health.

On the one side, there was the loose alignment of institutions, agencies, and actors that formalised the Alma-Ata declaration – a coalition that, until the mid-1970s, included the World Bank itself – in its support for prioritising of sanitary conditions and housing “as causes of poor health” (World Bank, 1975). They proposed that priorities should result from an understanding of basic rights and key principles. Indeed, the Alma-Ata declaration recommended that, in order to achieve a socially and economic productive life, it was a necessary condition that citizens were given access to basic sanitation and water supply, immunization against major infectious diseases, maternal and child health, health education, etc. (WHO 1978, 2). Contrary to the Ghana team’s claim, this was not a ‘mere assertion’: it was based on established ways of analysing mortality and morbidity data, perhaps best epitomised in Omran’s model of epidemiological transition. Omran’s model drew on the developmental narrative of demographic transition theory, which had underpinned many of the fertility programmes implemented in the ‘third world’ by the UN, to propose that “mortality is a fundamental factor in population dynamics” (Omran 1971, 511). The model suggested that, while transition to the ‘age of receding pandemics’ had been sustained by the introduction of basic sanitation and other infrastructural changes, the shift to the low level equilibrium of the ‘age of degenerative diseases’ could only be achieved by widening access to basic health care provision (e.g., maternal health, etc.) (Weisz and Olszynko-Gryn 2009). I would suggest a sentence restructure. How does this sound? ‘For those supporting the Alma-Ata declaration, this developmental way of reasoning about populations, if not directly the theory itself, provided a sound, robust basis for the elaboration of priorities and public health programmes that fitted the needs of specific populations.

On the other side were those that, as described above, argued that the scarcity of resources available dictated the need for a different way of setting priorities in international health. By the late 1970s, however, these were in a relatively marginal position (see WHO 1978). To overcome this, proponents of the selective approach had to challenge two aspects of the Alma-Ata line of reasoning. Where the latter saw health as a driver of economic wealth creation, the position of the Rockefeller Foundation and the World Bank was that available economic wealth constituted an antecedent restriction on the investment in health (McNamara 1978). By highlighting the shortage of resources limiting the formulation of policies, they were returning to Malthusian-type arguments about the regulatory role of scarcity in the dynamics of populations, which demographic transition models had originally attempted to displace (Ramsden 2002). Now encased in the language of mainstream economics, scarcity entailed the formulation of choices with differing opportunity costs. But how were those choices to be articulated? Answering this required a critique of the epistemic basis used by those supporting the Alma-Ata declaration. As Walsh and Warren put in their report on the Bellagio Centre conference:

The state of ill health found in many less developed countries should not be approached as a single problem. Traditional indicators such as child mortality or life expectancy are insufficient for grasping the issues involved. Health is complex multifaceted problem, an amalgam of many diseases with multiple causes. Indicators are actually distilled composites of hundreds of different health problems and disorders. [...] Diseases endemic to the less developed countries are protean in their etiologies, mechanisms of transmission, impacts on humans and susceptibility to attack. It is unlikely that any single mode of would be suitable for all. Each disease must be considered individually, with its unique mix of epidemiological, ecological and social factors. (Walsh and Warren 1979, 145-6)

Instead of patterns of mortality related to general types of disease (e.g., infectious diseases), Walsh and Warren proposed that morbidity could be disaggregated into different ‘etiologies’. This made indicators such as child mortality or life expectancy inadequate to capture not only the mechanism of disease causation but also the impact of ill health on persons. They were thus ill equipped to serve policy formulation. Such a disparaging assessment of the value of life expectancy to understand population health is of key significance. Although at least since the 1960s, as discussed above, researchers had been trying to develop metrics that could capture the ‘quality’ of life lived, most notably by Sullivan (1970), these, as the GHAPT put it, “did not relate [...] to specific diseases and thus [were] not likely to be of direct value in determining the allocation of health resources” (GHAPT 1981, 77). The indicator that most suited such purpose, they argued, was instead the concepts of ‘healthy life lost’ to illness, which had originally been developed by Dempsey in 1947 to question the value of mortality rates in creating the emergent view that the significance of tuberculosis was decreasing in the US (Romeder and McWhinnie 1977).

Further, it was an accepted view amongst those attempting to develop measures of population health that ‘quality of life’ calculations were best suited for societies where the prevalence of chronic disease justified a focus on the impact of illness on social functioning (e.g., Sullivan 1966, 1). These were assumed to map onto societies in the ‘developed world’, but, during the first half of the 1980s, the WHO Global Epidemiological Surveillance and Health Situation Assessment Unit led a series of studies that questioned the neat mapping between development regions of the world and the prevalence of types of disease. For example, using WHO mortality data, it was found that “50% of all deaths in the world due to [cardiovascular illness or cancer] occur in the developing world” (Hakulinen, Hansluwka, Lopez, and Nakada 1986, 347). Using mortality data was important because it directly challenged the epidemiological transition model with its own preferred statistic. This challenge, however, did not lead to a rejection of the epidemiological transition theory. What appears to have happened is that, for those supporting a selective approach to international health care programmes, the model came to refer to overlapping patterns of mortality observed in developing countries, losing its explanatory power along

the way (e.g., WHO 1991, 75). The shift was such that by 1994, the GBD lead researchers would propose that, in developing countries the “*so-called* ‘epidemiological transition’ is already much further advanced than many public health specialists appreciate” (Murray and Lopez 1994, 2: our emphasis).

To a very significant degree, this controversy is still unresolved (Shreker 2015). On the one side, there are those, endorsed by the WHO and supported by the Melinda and Bill Gates Foundation, who argue for the need to validate new methodologies and implements to ascertain the value of health interventions across populations. This can be seen as epitomised in the establishment of the Institute of Health Metrics and Valuation and the GBD 2010 study, which aimed, as referred above, to measure the quantity of health in terms of the ‘limitations’ illnesses imposes “on what [persons] can do in life” (Salomon et al. 2013). They favour methodologies that aim to identify ‘gains’ in health obtained from the application of discrete interventions and simulate the ideal of economic choice of investment in the face of scarce resources. On the other side, there are those who argue that existing statistical techniques enable the identification of constant conjunctions between socio-economic conditions and public health infrastructure, and health outcomes across populations (Scribner et al. 2017). They thus place less value on developing a standardised measure of health gain and more on making visible and quantifying the inequalities and inequities in global health. For them, health research should not be concerned with the question of whether public health interventions work but, instead, with understanding the process of making them work in specific contexts; it is not a question of if, but how.

4. Context Means Comparison

In the first section of the paper, we have suggested that contemporary social science research has identified a key role for health metrics in the governance of global health processes. In this, there is some agreement that health metrics support understanding and managing health care through an economic framing, both in terms of how health is seen to lead to economic development and how decision making is deployed as a discrete choice between alternative ‘goods’. We have argued, however, that this analysis partially glosses over the uncertain and controversial nature of using DALYs to allocate health care resources across populations. Such a proposal is better understood against an agonistic background, where divergent ways of linking knowledge making on population health to health care policy and institutions have maintained a dynamic of critique and justification for at least three decades.

The key consequence of this analysis is the realisation that health metrics should not be investigated in isolation. As was suggested on both sections, DALYs belong to a wider set of health measurement techniques and proce-

dures; while the DALY has been the main form used to measure health in the Global South, its generation and transformation is integrated in a wider history of health measurement and valuation, as was indicated above. Health measurement assembles what Clarke (1991) would label a ‘social arena’. The importance of this wider field of action was, in fact, acknowledged by the developers of the DALY themselves in the GBD publication that first described the metric:

In order to capture the impact of both premature death and disability in a single measure, a common currency is required. Since the late 1940s, researchers have generally agreed that time is an appropriate currency: time (in years) lost through premature death, and time (in years) lived with a disability. A range of such time-based measures has been developed in different countries, many of them variants of the so -called Quality Adjusted Life Year or QALY. For the GBD, an internationally standardized form of the QALY has been developed, called the Disability Adjusted Life Year (DALY). (Murray and Lopez 1996, 6-7)

Opposing the use of a common currency to the ‘partial and fragmented’ health statistics of specific causes of death, Murray and Lopez emplace their new metric within a longstanding field of research where there is consensus that time (years) should be deployed as basic unit of measurement. This consensus, they suggest, has enabled the generation of a variety of measures which can be grouped around the idea of *Quality Adjusted Life Year*, of which the DALY is a variant. Thus, it is proposed that this represents an ‘international standardised form of the QALY’.

Given what was discussed in relation to the DALY in the previous section, Murray and Lopez’s assertions might appear unusual. This is because it is now accepted that, if anything, the DALY represents the negative of QALY, measuring disability or ‘healthy life lost’ instead of quality of life, or as Murray, Salomon, and Mather (2000) would put it years later, measuring ‘health gaps’ rather than ‘health expectancy’. However, in the moment that Murray and Lopez were writing the QALY, it represented the most widely known metric used in health. As such, it constituted a point of reference, or rather, a signifier for an ‘arena’ into which the DALY could be placed. This was important for GBD lead researchers because it enhanced the DALY’s differentiation from the ‘partial and fragmented’ health statistics used by public health researchers and advocates (i.e., those who relied on ‘epidemiologic transition’ arguments to justify policies). Like the QALY, the GBD researchers argued that the DALY aimed “to disentangle epidemiology from advocacy in order to produce objective, independent [...] assessments of health” (Murray and Lopez 1996, 6). Linking the DALY to the QALY thus enabled the establishment of a boundary between the previous work done by epidemiologists comparing the health of populations, such as Omran, and the work of the WHO GBD studies team. Crucially, like the QALY, it did such assessments in order to “allow policy-

makers to compare the relative cost-effectiveness of different interventions” (Murray and Lopez 1996, 6).

However, GBD researchers were attempting to differentiate between QALY valuations, which depended not only on different techniques of quantification but also on how different societies valued health, and a form of valuation that enabled comparisons between territories and populations. This aim hinges on the ability to craft what Mol (2002) labelled as a ‘comparative platform’, or rather, an operation supported by techniques that place differences and similarities between cases side by side (Moreira 2007; Stengers 2011; Deville, Guggenheim, and Hrdličková 2016). In so doing, it creates that which is compared, that is to say, comparison elicits value that is commensurate. However, rather than producing commensuration by negotiating and compromise, as did QALY proposers, the DALY was firmly attached to a set of ‘value judgements’, which Murray and colleagues deemed to be ‘equalitarian’. Such value judgements underpin the technical basis of valuation in the DALY approach: its focus on time lost, the emphasis on healthy life lost in the proximate future, the use of standardised disability weights, and the differential valuation of time lived at different ages. The latter two are particularly illustrative of the process of standardisation underpinning the DALY.

With regards to age-weighting, instead of linking differential valuation of disability by age to ‘productivity weights’, as would be predicted by the theory of human capital, DALY champions viewed “unequal age-weights as an attempt to capture different social roles at different ages” (Murray 1994, 435). Moving away from a strictly economic valuation of social functioning, suggested for example by the World Bank (1993) (see above), they emplaced value judgement on the ‘original position’, or rather, the ‘thick veil of ignorance’, which was a thought experiment proposed by Rawls (1971) and much used in the health policy thinking (e.g., Menzel 1999). Interestingly, in an effort to operationalise this experiment without deriving weights by application of general principles to the relationship between age and role, they conducted a Delphi conference with ‘public health experts’ so as to obtain a function of weighting by age.

In relation to disability weighting, although using the similar consensus generating techniques, the procedure hinged on a specific normative differentiation that would prove problematic. The WHO International classification of impairments, disabilities, and handicaps (1980) differentiated between ‘disability’ – a functional limitation resulting from an organic impairment – and ‘handicap’ – a socio-economic disadvantage or impact resulting from functional limitation. Recognising the attraction linked to measuring handicap, DALY proponents were concerned that it might lead to reinforcing inequalities as the ‘same’ functional limitation would be valued differently depending on the context where people lived (Murray 1994, 437-8). This decision had the key advantage of enabling weights to be generated without knowledge of the particular circum-

stances experienced by individuals. This meant that disability was defined by ‘universal’ human abilities such as seeing, speaking, grasping, and activities such as dressing or washing.

Both age-weighting and disability weighting proved to be, for different reasons, especially problematic features of the DALY (Voigt and King 2012). Age weighting was attacked for relying on the assumption that the disabling effects of disease become less significant with age. It was not only that procedure made widespread suppositions about the value of older people in society across cultures, but also that it was going against the emerging scientific and political questioning of chronological age as a valid index of an individual’s function or health (Moreira 2016). As in the domain of disability politics, activists argued that such beliefs effectively prevented older people from participating in social and economic life.

Indeed, by the turn of century, the WHO itself had articulated a policy framework – ‘active ageing’ – that explicitly aimed to optimise economic, social, and cultural participation throughout the life course by removing barriers to participation, which included the incorporation of older people in research (Lassen and Moreira 2014). Response to this shifting context and to challenges from bioethicists (see Murray, Salomon, Mathers, and Lopez 2002, Part 13) entailed making age weights progressively uniform in the GBD 2010 (Voigt and King 2014, 226).

However, criticisms related to disability weights proved more challenging as it questioned the very possibility of comparing levels of health across populations and time points. While the solution to the age-weighting problem reinforced the internal consistency of the standard, disability politics threatened to undermine the key comparative aims of the DALY (Murray and Lopez 1994). To address this problem, new weights were defined through surveys in which lay descriptions of different health states were used to elicit valuations (Ustun et al. 2001). These were not seen as reflecting preferences, as in the QALY approach, but instead as appealing to an ‘intuitive, common sense’ notion of health (Murray, Salomon, Mathers and Lopez 2002, 736-7) which allowed cardinal grading of health states. It was then possible to map differentiated weights onto the territorially bound prevalence of disease and disability data. The aim, however, remained to isolate loss in health from disadvantages in welfare and from the impact of the social environment. In this, the goal was to measure ‘health’ in a narrow sense, independent of welfare and socio-cultural differences.

Such belief in the ability to isolate health from welfare and social context is precisely the major criticism Voigt and King make to the GBD 2010. They argue that this belief is not only ill founded, as health is interdependent on social, economic and cultural conditions (Blaxter 2004), but also that it entails a narrowing of the criteria for political making decision making [do you mean ‘political decision making’?]. They suggest that while using metrics such as the

DALY might be key to monitoring health equity across the globe, this should be distinguished from “using them to determine priorities and allocate resources among different diseases in different countries” (Voigt and King 2014, 227). However, as was argued above, the comparative epidemiological aim cannot be easily separated from the politics of decision making. For GBD researchers, the mapping of disease burden and valuation of ‘healthy life lost’ is aimed at shaping, or disciplining, how decisions are made. This, in effect, requires foregoing complexity for commensurability or comparability. As the GBD lead researchers put it:

Comparability is fundamental to the use of survey results for development of evidence for health policy but has been under-emphasised in instrument development [...] The basis of science is comparable measurement: comparison creates possibilities of investigating broad determinants at national and cross-national level. [...] Health measurements, particularly for policy makers, generally only have meaning in context, and context means comparison. (Murray, Salomon, Mathers and Lopez 2002, 746-7)

Context means comparison. By presenting comparability as the condition for good, rational and effective decision-making, the GBD researchers situate local and national policy in a scenario in which the international context guarantees objectivity. Context is, in this case, the type of information available for the decision maker. As with the QALY, health measurement is defined in relation to an imagined type of decision making for which normative assumptions are made. In practice, however, such assumptions operate through infrastructures in which measurement and evaluation are the gateway for funding and programmes justification.

5. Conclusion

Health metrics can be conceptualised as a social arena (Clarke 1991). They have been shaped by reference to each other and by common conflicts, connections, and exchanges. These metrics have shaped Global health as a domain of research, policy, and practice. A closer view to the development of metrics, such as the DALY, has shown the interactive relation between health measurement and politics of health. This relation has been characterised by uncertainty and debates between epidemiologists and other global health experts about the consequences of measuring in health decision-making.

This paper has presented some elements to help with the understanding of the entanglement between metrics and specific health policies. Measurement and quantification in health have been aspects of a contested field in which the conceptions of health and social policies have been debated, negotiated, and legitimated. Our starting point was the social science scholarship about global health metrics. These works have shown how the market, as a normative mod-

el, has shaped health policy and the key role of metrics in this process. However, as we have presented, this account is partial and does not take into consideration the contested development of these metrics nor the debate in public and global health about their normative assumptions. We have presented two facets of this process: the roots of the DALY in the controversy about primary health care and the epistemological connections between health and measurement. The metrics are health currencies based on time.

The controversy surrounding primary health care has shown the political interest in establishing a monopoly on the measurement and quantification within healthcare. Despite the Alma-Ata formation being based on the epidemiological transition model, its critics claimed that the lack of the right measuring infrastructure made the declaration abstract and idealistic. The DALY and the Global Burden of Disease are the development of a critique that introduced scarcity in health measuring and decision making. Scarcity will reach a regulatory role, encased in the language of mainstream economics. The discussion about costs of opportunity and cost-effectiveness that scarcity entails are put in the centre of health measurement.

This paper has examined the origins of the DALY as an international standardised version of QALY and the epistemology that these metrics share. The development of the DALY and the Global Burden of Disease shows the use of standardisation and quantification as a response to what is, from a technocratic perspective, perceived as conventional politics. However, as we have presented, such standardisation is generative and has made new debates about the normative assumption of health decision-making possible. In attempting to address critiques, the DALY has revealed its conventional basis and its limitations in capturing the 'value of health' for specific populations.

The most remarkable feature of the DALY is its comparability across types of illness, but most importantly across nations. The importance of comparison is a consequence of the interest of GBD researchers in establishing a concept of health independent of references to socio-cultural specificities and material context. DALY and GBD infrastructures are shaped by a commitment to capturing health as a 'pure' quality. Through comparability, the DALY provides its own context and becomes the basis of objective health decision-making.

We are witnessing the development of an institutional complex of metrics, policies, and funding in Global health based on the idea that measuring 'health' in a narrow sense, independently of considerations about welfare and socio-cultural differences, constitutes the best way of tracking the effectiveness of interventions and policies. These metrics provide a context for decision making that is significantly affecting how policies, interventions, and resources are justified and contested. Our paper has hopefully contributed to opening the framing of these decisions. By exploring the paths not taken, our paper offers new possibilities for an alternative standard and 'investment in form' in global health.

References

- Adams, Vincanne, ed. 2016. *Metrics. What Counts in Global Health*. Durham: Duke University Press.
- Armstrong, David, and Deborah Caldwell. 2004. Origins of the Concept of Quality of Life in Health Care: A Rhetorical Solution to a Political Problem. *Social Theory & Health* 2 (4): 361-71.
- Arrow, Kenneth. 1963. Uncertainty and the Welfare Economics of Medical Care. *American Economic Review* 5 (5): 941-73.
- Bartley, Melanie, George-Davey Smith, and David Blaine. 1997. Vital Comparisons: The Social Construction of Mortality Measurement. In *The Sociology of Medical Science and Technology*, ed. Mary Ann Elston, 127-52. Oxford UK and Malden MA: Blackwell.
- Becker, Gary. 1962. Investment in Human Capital: A Theoretical Analysis. *Journal of Political Economy* 70: 9-49.
- Blaxter, Mildred. 2004. *Health*. Cambridge, Polity.
- Boltanski, Luc, and Laurent Thévenot. 2005. *On Justification. Economies of Worth*. Princeton: Princeton University Press.
- Bowker, Geoffrey, and Susan Leigh Star. 1999. *Sorting things out: classification and its consequences*. Cambridge, Mass.: MIT Press.
- Bowling, Ann. 2005. *Measuring Health: a Review of Quality of Life Measurement Scales*, 3rd ed. Buckingham: Open University Press.
- Brown, Theodore, Marcus Cueto, and Elizabeth Fee. 2006. The World Health Organization and the Transition from “International” to “Global” Public Health. *American Journal of Public Health* 96 (1): 62-72.
- Cambrosio, Alberto, Peter Keating, Thomas Schlich, and George Weisz. 2009. Biomedical Conventions and Regulatory Objectivity: A Few Introductory Remarks. *Social Studies of Science* 39 (5): 651-64. <<http://www.jstor.org/stable/27793316>>.
- Cicourel, Aaron. 1964. *Method and Measurement in Sociology*. New York: Free Press.
- Clarke, Adele. 1991. Social Worlds/Arenas Theory as Organizational Theory. In *Social Organization and Social Process: Essays in Honor of Anselm Strauss*, ed. D. Maines, 119-58. Hawthorne (NY): Aldine de Gruyter.
- Cueto, Marcus. 2004. The Origins of Primary Health Care and Selective Primary Health Care. *American Journal of Public Health* 94 (11): 1864-74.
- Darkwa, Benefo K., and T. Paul Schultz. 1994. *Determinants of Fertility and Child Mortality in Côte D'Ivoire and Ghana*. Living Standards Measurement Study. Working Paper 103. Washington DC: The World Bank.
- Dempsey, Mary. 1947. Decline in Tuberculosis; the Death Rate Fails to Tell the Entire Story. *American Review of Tuberculosis* 56 (2): 157-64.
- Derksen, Linda. 2000. Towards a Sociology of Measurement: The Meaning of Measurement Error in the Case of DNA Profiling. *Social Studies of Science* 30 (6): 803-45.
- Deville, Joe, Michael Guggenheim, and Zuzana Hrdličková, eds. 2016. *Practicing Comparison: Logics, Relations, Collaborations*. Manchester: Mattering Press.

- Foucault, Michel. 2009. *Security, Territory and Population, Lectures at the College de France*. New York: Palgrave
- GHAPT. 1981. A Quantitative Method of Assessing the Health Impact of different Diseases in less Developed Countries: Ghana Health Assessment Project Team. *International Journal of Epidemiology* 10 (1): 73-80.
- Gold, Marthe, Joana Siegel, Luise Russell, and Milton C. Weinstein, eds. 1986. *Cost-Effectiveness in Health and Medicine*. New York: Oxford University Press.
- Goldin, Claudia. 2016. Human Capital. In *Handbook of Cliometrics*, ed. Claude Diebolt and M. Hauptert, 55-86. Heidelberg: Springer.
- Hacking, Ian. 1990. *The Taming of Chance*. Cambridge: Cambridge University Press.
- Hakulinen, Timo, Harald Hansluwka, Alain Lopez, and Toru Nakada. 1986. Global and Regional Mortality Patterns by Cause of Death in 1980. *International Journal of Epidemiology* (2): 226-33.
- Ho, Teresa, DRC. 1982. Measuring Health as a Component of Living Standards. Living Standards Measurement Study (LSMS) Working Paper; No. LSM 15. Washington, DC: The World Bank.
- Kenny, Katherine. 2015. The Biopolitics of Global Health: Life and Death in Neoliberal Time. *Journal of Sociology* 51 (1): 9-27.
- Lampland, Martha, and Susan Leigh Star, eds. 2009. *Standards and their Stories: How Quantifying, Classifying and Formalizing*. New York: Practices Shape Everyday Life. New York: Cornell University Press.
- Lassen, Aske, and Tiago Moreira. 2014. Unmaking old Age: Political and Cognitive Formats of Active Ageing. *Journal of Aging Studies* 30: 33-46
- Latour, Bruno. 2005. *Reassembling the Social. An Introduction to Actor-Network Theory*. Oxford: Oxford University Press.
- Lynch, Michael. 1991. Ordinary and Scientific Measurement as Ethnomethodological Phenomena'. In *Ethnomethodology and the Human Sciences*, ed. G. Button, 77-108. Cambridge: Cambridge University Press.
- Maldonado, Oscar. 2018. Making HPV Vaccines efficient: Cost-Effectiveness Analysis and the Economic Assemblage of Healthcare in Colombia. *Science & Technology Studies* 31 (2): 2-18.
- Mathers, Collin, Theo Vos, Alain Lopez, Josh Salomon, and Majid Ezzati, eds. 2001. *National Burden of Disease Studies: A Practical Guide. Edition 2.0. Global Program on Evidence for Health Policy*. Geneva: World Health Organization.
- McKeown, Thomas. 1976. *The Modern Rise of Populations*. New York: Academic Press.
- McNamara, Robert S. 1978. *Ansprache an den Gouverneursrat von Robert S. McNamara. Presidential Speech*. Washington, DC: World Bank. <<http://documents.worldbank.org/curated/en/217841468349776299/Ansprache-an-den-Gouverneursrat-von-Robert-S-McNamara>>.
- Menzel, Paul. 1999. How Should what Economists Call "Social Values" be Measured? *The Journal of Ethics* 3 (3): 249-73.
- Mirowski, Philip. 2002. *Machine Dreams: Economics Becomes a Cyborg Science*. Cambridge: Cambridge University Press
- Mol, Annemarie. 2002. *The Body Multiple: Ontology in Medical Practice*. Durham and London: Duke University Press.

- Moreira, Tiago. 2007. Entangled Evidence: Knowledge Making in Systematic Reviews in Healthcare. *Sociology of Health & Illness* 29 (2): 180-97.
- Moreira, Tiago. 2010. Now or Later? Individual Disease and Care Collectives in the Memory Clinic. In *Care in Practice: On Tinkering in Clinics, Homes and Farms*. Mol, Annemarie, ed. Ingunn Moser and Jeanette Pols, 119-40. Berlin: Transcript Verlag.
- Moreira, Tiago. 2012. *The Transformation of Contemporary Health Care. The Market, the Laboratory, and the Forum*. New York-Oxon: Routledge.
- Moreira, Tiago. 2016. De-Standardising Ageing? Shifting Regimes of Age Measurement. *Ageing & Society* 36 (7): 1407-33.
- Moriyama, Iwao. 1964. The Change in Mortality Trend in the United States. *Vital Health Stat* 1: 1-43.
- Murray, Christopher, and Alain Lopez. 1996. Global and Regional Descriptive Epidemiology of Disability: Incidence, Prevalence, Health Expectancies, and Years Lived with Disability. In *The Global Burden of Disease*, ed. C. J. L. Murray and A. D. Lopez, 201-46. Cambridge, MA: Harvard University Press.
- Murray, Christopher, Alain Lopez, and Dean Jamison. 1994. The Global Burden of Disease in 1990: Summary Results, Sensitivity Analysis and Future Directions. *Bull World Health Organ* 72 (3): 495-509.
- Murray, Christopher, and Alain Lopez. 1994. Quantifying Disability: Data, Methods and R. *Bull World Health Organ* 72 (3): 481-94. [PMC free article] [PubMed].
- Murray, Christopher. 1994. Quantifying the Burden of Disease: The Technical Basis for Disability-Adjusted Life Years. *Bull World Health Organ* 72 (3): 429-45. [PMC free article] [PubMed].
- Murray, Christopher, and Alain Lopez. 1996. *Global Burden of Disease. A Comprehensive Assessment of Mortality and Disability from Diseases, Injuries, and Risk Factors in 1990 and Projected to 2020*. Cambridge: Harvard University Press.
- Murray, Christopher, Joshua Saloman, Collin Mathers, and Alain Lopez. 2002. *Summary Measures of Population Health: Concepts, Ethics, Measurement, and Applications*. Geneva: World Health Organization.
- Omran, Abdel R. 1971. The Epidemiological Transition: A Theory of the Epidemiology of Population Change. *The Milbank Memorial Fund Quarterly* 49.4.1: 509-38.
- Packard, Randall. 2016. *A History of Global Health Interventions into the Lives of Other Peoples*. Baltimore: Johns Hopkins University Press.
- Pfeiffer, David. 1998. The ICIDH and the Need for its Revision. *Disability & Society* 13 (4): 503-23.
- Ramsden, Edmund. 2002. Carving up Population Science Eugenics, Demography and the Controversy over the 'Biological Law' of Population Growth. *Social Studies of Science* 32 (5-6): 857-99.
- Rodin, Rebecca. 2013. Rethinking the Human: the WHO, the World Bank, and the Transition from International to Global Health. *Journal of the Anthropological Society of Oxford Online* 8 (2): 137-70.
- Romed JM, and JR McWhinnie. 1977. Potential Years of Life Lost between Ages 1 and 70: an Indicator of Premature Mortality for Health Planning. *International journal of epidemiology* 6: 143-51.

- Salomon Joshua, Theo Vos, Daniel Hogan et al. 2012. Common Values in Assessing Health Outcomes from Disease and Injury: Disability Weights Measurement Study for the Global Burden of Disease Study 2010. *Lancet* 380: 2129-43.
- Sassi, Franco. 2006. Calculating QALYs, comparing QALY and DALY Calculations. *Health Policy and Planning* 21 (5): 402-8.
- Schrecker, Ted. 2015. Bringing (domestic) Politics back in: Global and Local Influences on Health Equity. *Public Health* 127 (7): 843-8.
- Scribner, Richard, Neil Simonsen, and Claudia Leonardi. 2017. The Social Determinants of Health Core: Taking a Place-Based Approach. *American Journal of Preventive Medicine* 52: 13-9.
- Sjögren, Ebbe, and Claes Helgesson. 2007. The Q(u)ALYfying Hand: Health Economics and Medicine in the Shaping of Swedish Markets for Subsidized. In *Market devices*, ed. M. Callon, Y. Millo and F. Muniesa. Malden, MA: Blackwell
- Stengers, Isabelle. 2011. Comparison as a Matter of Concern. *Common Knowledge* 17: 48-63, 61.
- Schwartländer, Bernhard. 1997. Global Burden of Disease. *The Lancet* 350 (9071): 141-2.
- Sullivan, Daniel. 1971. "A Single Index of Mortality and Morbidity," HSMHA. *Health Reports* 86: 347-54.
- Sullivan, Daniel. 1966. Conceptual Problems in Developing an Index of Health, U.S. Department of HEW. Public Health Service Publication No. 1000, Series 2, No. 17.
- Thévenot, Laurent. 2009. Governing Life by Standards. A View from Engagements. *Social Studies of Science* 39: 793-813.
- Tolon, Kaya. 2011. Futures Studies: A New Social Science Rooted in Cold War Strategic Thinking. In *Cold War Social Science. Knowledge Production, Liberal Democracy, and Human Nature*, ed. M. Solovey and H. Cravens, 45-62. Mcmillan Palgrave: London.
- Torrance, George. 1986. Measurement of Health State Utilities for Economic Appraisal: A Review. *Journal of Health Economics* 5 (1): 1-30.
- Üstün, Tevfik, J. L. Ayuso-Mateos, and S. Chatterji. 2004. Global Burden of Depressive Disorders: Methods and Data Sources. *British Journal of Psychiatry* 184: 386-92.
- Voigt, Kristin, and Nicholas King. 2014. Disability Weights in the Global Burden of Disease 2010 Study: Two Steps forward, one Step back? *Bulletin of the World Health Organisation* 92: 226-8.
- Wahlberg, Ayo, and Nikolas Rose. 2015. The Governmentalization of Living: Calculating Global Health. *Economy and Society* 44 (1): 60-90.
- Walsh, Julia, and Kenneth Warren. 1979. Selective Primary Health Care: An Interim Strategy for Disease Control in Developing Countries. *The New England Journal of Medicine* 301 (18): 967-74.
- Weisz, George, and Jesse Olszynko-Gryn. 2010. The Theory of Epidemiologic Transition: The Origins of a Citation. *Journal of the History of Medicine and Allied Sciences* 65: 287-326.
- Winance, Myriam. 2008. La notion de handicap et ses transformations à travers les classifications internationales du handicap de l'OMS, 1980 et 2001. *Dynamis* 28: 377-406.

- World Bank. 1993. *World Development Report: Investing in Health*. Washington: World Bank.
- World Bank. 1975. *The Assault on World Poverty: Problems of Rural Development, Education and Health*. Baltimore, MD: The Johns Hopkins University Press.
- World Health Organization. 1978. Declaration of Alma-Ata. International Conference on Primary Health Care, Alma-Ata, USSR, 6-12 September 1978. Geneva: World Health Organization.
- World Health Organization. 1980. *The Work of WHO 1978-1979: biennial Report of the Director-General*. Geneva: World Health Organization.
- World Health Organization. 1991. *The Work of WHO 1989-1990: biennial Report of the Director-General*. Geneva: World Health Organization.

Historical Social Research Historische Sozialforschung

All articles published in HSR Special Issue 44 (2019) 2: Governing by Numbers.

Walter Bartl, Christian Papilloud & Audrey Terracher-Lipinski

Governing by Numbers - Key Indicators and the Politics of Expectations. An Introduction.

doi: [10.12759/hsr.44.2019.2.7-43](https://doi.org/10.12759/hsr.44.2019.2.7-43)

Laurent Thévenot

Measure for Measure: Politics of Quantifying Individuals to Govern Them.

doi: [10.12759/hsr.44.2019.2.44-76](https://doi.org/10.12759/hsr.44.2019.2.44-76)

Rainer Diaz-Bone

Statistical Panopticism and its Critique.

doi: [10.12759/hsr.44.2019.2.77-102](https://doi.org/10.12759/hsr.44.2019.2.77-102)

Timo Walter

Formalizing the Future: How Central Banks Set Out to Govern Expectations but Ended Up (En-)Trapped in Indicators.

doi: [10.12759/hsr.44.2019.2.103-130](https://doi.org/10.12759/hsr.44.2019.2.103-130)

Ingo Bode

Let's Count and Manage – and Forget the Rest. Understanding Numeric Rationalization in Human Service Provision.

doi: [10.12759/hsr.44.2019.2.131-154](https://doi.org/10.12759/hsr.44.2019.2.131-154)

Lisa Knoll & Konstanze Senge

Public Debt Management between Discipline and Creativity. Accounting for Energy Performance Contracts in Germany.

doi: [10.12759/hsr.44.2019.2.155-174](https://doi.org/10.12759/hsr.44.2019.2.155-174)

John Berten

Failed Indicatorisation: Defining, Comparing and Quantifying Social Policy in the ILO's *International Survey of Social Services* of the Interwar Period.

doi: [10.12759/hsr.44.2019.2.175-201](https://doi.org/10.12759/hsr.44.2019.2.175-201)

Oscar Javier Maldonado & Tiago Moreira

Metrics in Global Health: Situated Differences in the Valuation of Human Life.

doi: [10.12759/hsr.44.2019.2.202-224](https://doi.org/10.12759/hsr.44.2019.2.202-224)

Carlotta Mozzana

A Matter of Definitions: The Profiling of People in Italian Active Labour Market Policies.

doi: [10.12759/hsr.44.2019.2.225-246](https://doi.org/10.12759/hsr.44.2019.2.225-246)

Michael Huber & Maarten Hillebrandt

"Pay for Promise" in Higher Education: The Influence of NPM on Resource Allocation in German Universities.

doi: [10.12759/hsr.44.2019.2.247-269](https://doi.org/10.12759/hsr.44.2019.2.247-269)

Anne Piezunka

Struggle for Acceptance – Maintaining External School Evaluation as an Institution in Germany.

doi: [10.12759/hsr.44.2019.2.270-287](https://doi.org/10.12759/hsr.44.2019.2.270-287)

Philipp Lepenies

Transforming by Metrics that Matter – Progress, Participation and the National Initiatives of Fixing Well-Being Indicators.

doi: [10.12759/hsr.44.2019.2.288-312](https://doi.org/10.12759/hsr.44.2019.2.288-312)

Oliver Holtemöller & Christoph Schult

Expectation Formation, Financial Frictions, and Forecasting Performance of Dynamic Stochastic General Equilibrium Models.

doi: [10.12759/hsr.44.2019.2.313-339](https://doi.org/10.12759/hsr.44.2019.2.313-339)